Agilent 5890 GC Control Driver User Guide

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Introduction

This document describes the configuration of the Agilent Technologies 5890 GC driver. It also explains how to build a control method for this driver, how to start and view a running acquisition and what actions are available during an analysis.

Installation and Configuration

Installing the Driver Software

To install the CompassCDS Drivers software, refer to the CompassCDS Installation Guide.

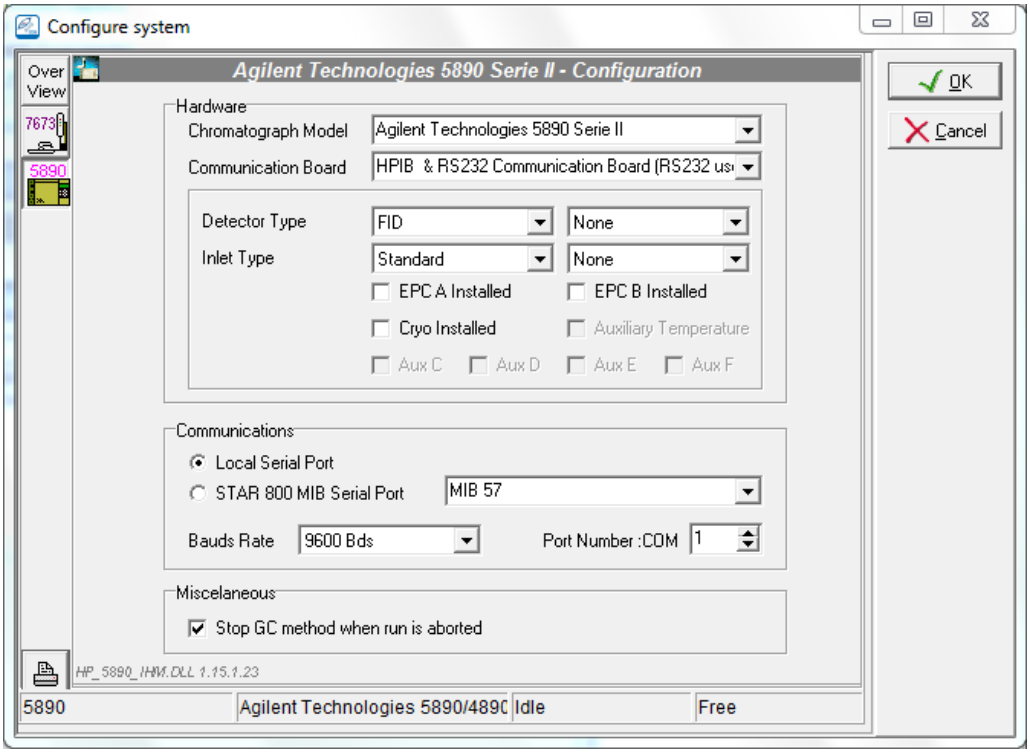
Configuring the Driver

The driver software configuration is done in the CompassCDS Configuration Manager when a new chromatographic system is created.

Configuring the Agilent Technologies 5890 Gas Chromatograph

Click on the

button corresponding to the Agilent Technologies 5890 Gas Chromatograph driver and the configuration screen appears:



Hardware Parameter Group

Chromatograph Model:

Select the Chromatograph Model. The available models are: Agilent Technologies 4890A, Agilent Technologies 4890D, Agilent Technologies 5890 Series I, Agilent Technologies 5890 Series II and Agilent Technologies 5890 Series II +.

Communication Board:

Choose HPIB and RS232 Communication Board (RS232 used) in the list. The HPIB and RS 232 Communication Board (HPIB used) is not implemented and the Simple RS232 Communication Board is not recommended.

NOTE: Refer to the *Appendix* to learn more about the cables needed for the GC connection to the MIB-interface.

Detector Type:

The left scrolling list allows you to select the front detector. The right scrolling list allows you to select the back detector. The available choices are: None, ECD, FID, NPD, TCD, and FPD.

Inlet type:

The left scrolling list allows you to select the front inlet. The right scrolling list allows you to select the back inlet.

The available choices are: None, Standard, and PCOC. PCOC stands for Programmable Cool On-Column.

EPC A installed:

Check this box if the Electronic Pressure Control option is installed for the front inlet. This option is available only for the Agilent Technologies 5890 Series II and Series II +.

EPC B installed:

Check this box if the Electronic Pressure Control option is installed for the back inlet. This option is available only for the Agilent Technologies 5890 Series II and Series II +.

Cryo installed:

Check this box if the cryogenic oven option is installed. This option is available only for the Agilent Technologies 5890 Series II and Series II +.

Auxiliary Temperature:

Check this box if an auxiliary temperature option is installed. This option is available only for the Agilent Technologies 5890 Series II +.

Aux C, Aux D, Aux E and Aux F:

Check the corresponding box(es) if the auxiliary electronic pressure control option is installed. This option is available only for the Agilent Technologies 5890 Series II+.

Communications Parameter Group

Local Serial Port:

Select this option if the chromatograph is directly connected to the PC.

Star 800 & 850 MIB Serial Port:

Select this option and then the name of the MIB-interface used to connect to the chromatograph.

NOTE: If you will use the serial port installed in the MIB-interface, configure the MIB-interface before configuring the Agilent Technologies 5890 Gas Chromatograph driver.

Bauds Rate:

Choose 9600 Bds.

Port Number: COM:

Select the PC or STAR 800 & 850 MIB-interface Serial port number to which the chromatograph will be connected.

Miscellaneous Parameter Group

Stop GC method when run is aborted:

Check this box if you want the instrument to immediately return to the initial conditions after aborting a run. All current programs will also be aborted.

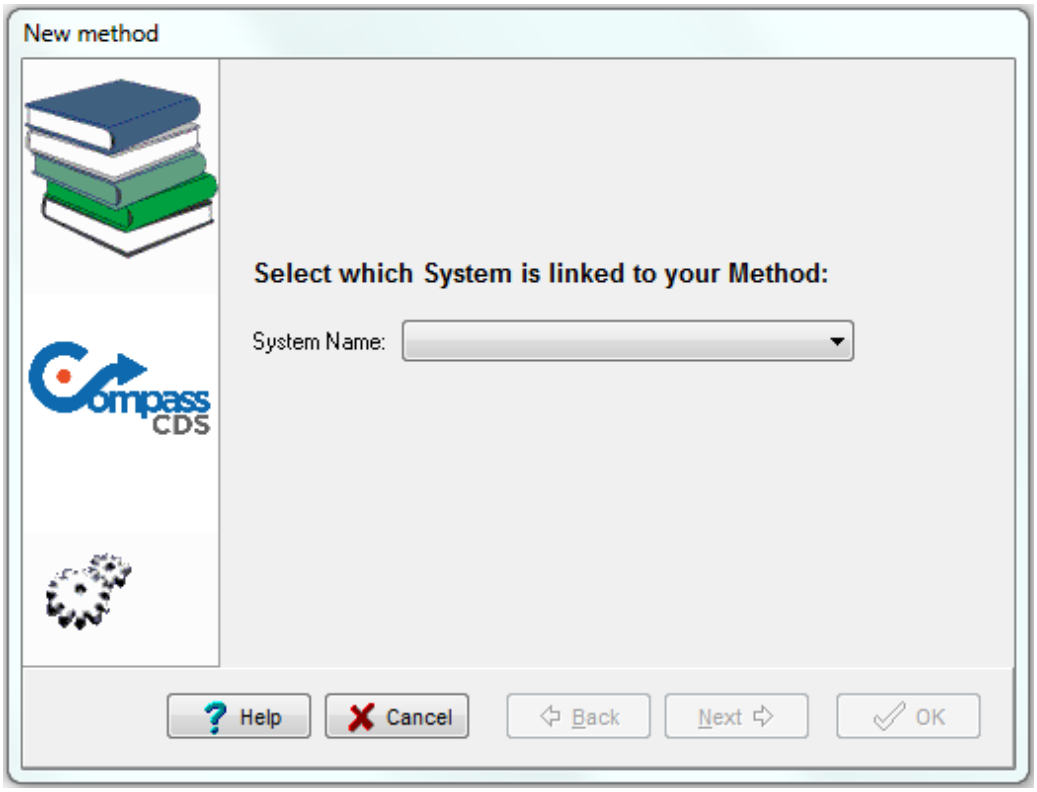
Building a Method

Creating a New Method

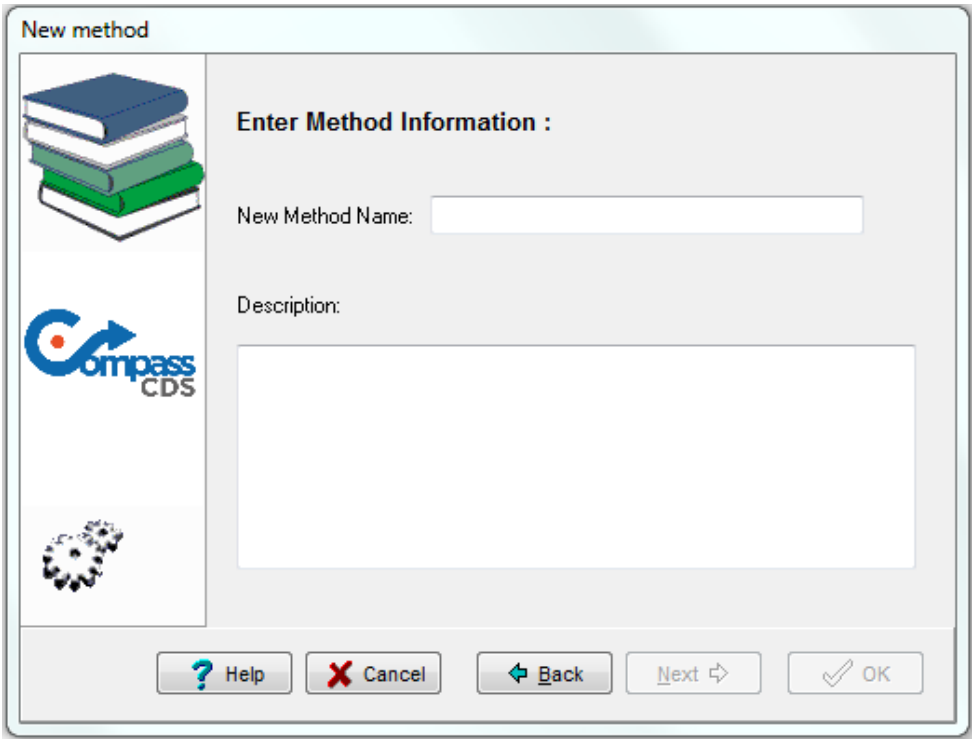
The method contains parameters for instrument control, data acquisition, chromatogram processing, and editing of final results. To initially set up a method, it is not necessary to define all of the sub-method sections; however, you must fill in the instrument control section prior to starting an acquisition.

1. To create a new method, select the ***FILE / NEW METHOD*** option from the CompassCDS Chromatography Data System main menu.

   A wizard guide will appear and provide assistance during the first steps of method creation:



2. Choose the system (chromatograph) associated with the method. A method is created for a particular system. When starting an acquisition, the name of the system that performs the acquisition must be correct, since method access is limited only to those methods associated with this system.
3. Once this field is completed, click on the Next button to move to the second step of the method creation:



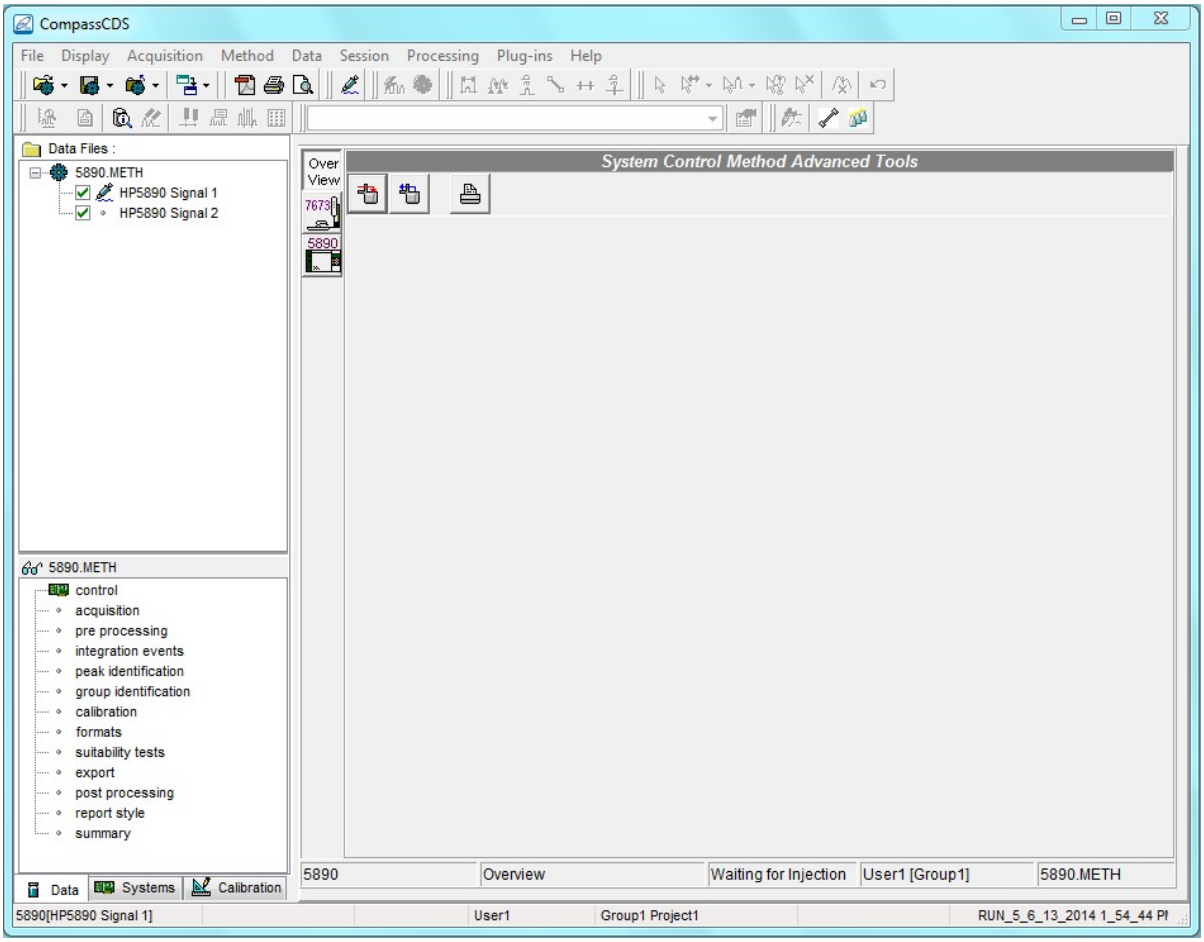
4. Enter the New Method Name in the first field. In the Description field, enter information concerning the method (optional).
5. Once these two fields have been completed, click on the OK button. The new method is created and is opened with default parameters in the CompassCDS Chromatography Data System. The next step is the definition of each of the method sections.

The control section must be defined in order to start an acquisition. In the following part of this guide, only the instrument control section for the Agilent 6890 Gas Chromatograph is detailed. Other parameters such as Injection Volume, Vial and Rack number may be necessary and are defined in the acquisition section.

NOTE: For more details about the programming of each method section, turn to the CompassCDS User Guide.

Control Method Section for the Agilent 5890 Gas Chromatograph

Once the new method is created, select the control section in the lower part of the browser. The following screen appears:



Press the Over View button to display the ***System Control Method Advanced Tools*** window:

to send the current method to the instrument

to get the active method from the instrument

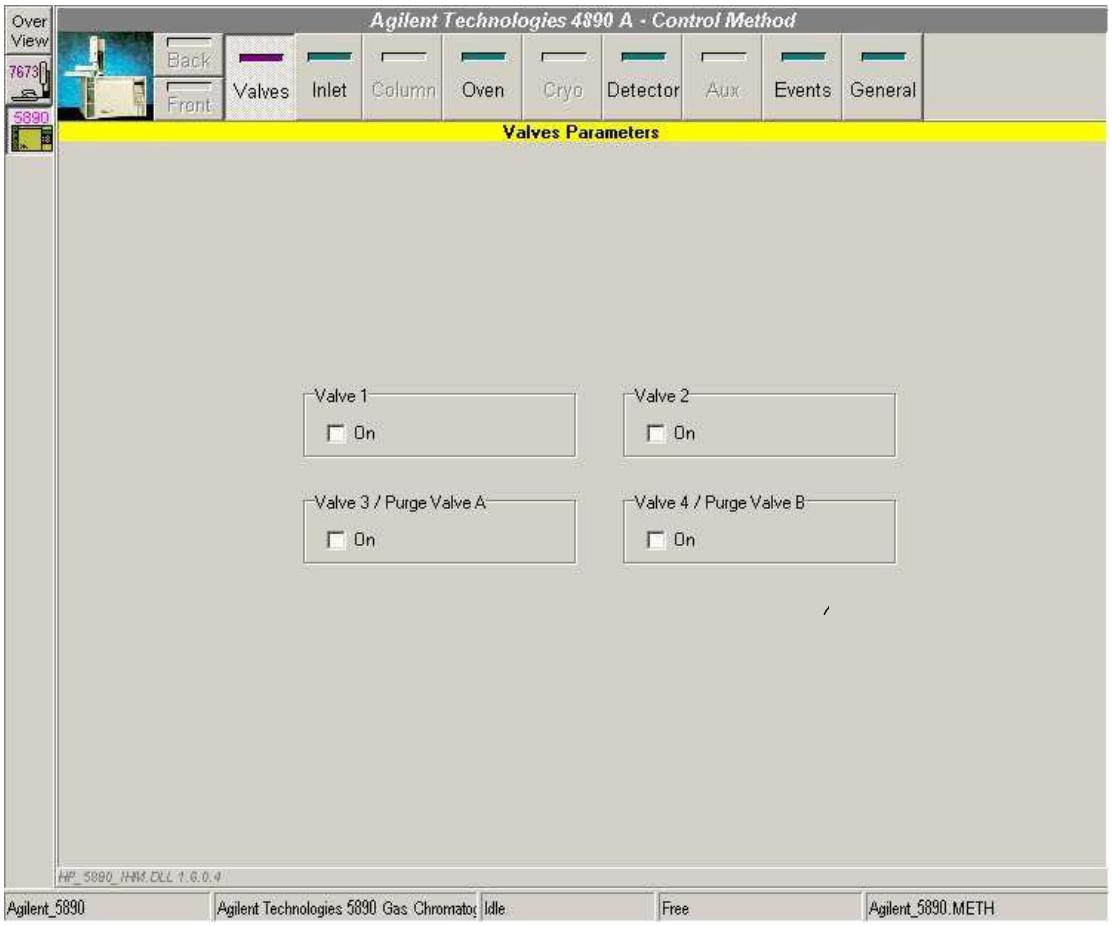
to print the current method

Click on the 5890 button to display the Agilent 5890 Gas Chromatograph control method section.

It contains four sub-sections which are always active: Valves, Oven, Events and General. Up to five additional sub-sections can be also activated depending on the system configuration: Inlet (if at least one inlet has been configured), Column (if EPC A or/and EPC B have been configured), Cryo (if Cryo has been configured), Detector (if at least one detector has been

configured) and Aux (if Auxiliary Temperature, Aux C, Aux D, Aux E or Aux F have been configured), and Valves (if Valves have been configured). Click on the required sub-section to define the corresponding parameters that will be used during the chromatographic run.

Valves Control



Check the box corresponding to the valve to switch it *On*. Valve 1 manages a relay.

Valve 2 manages a relay.

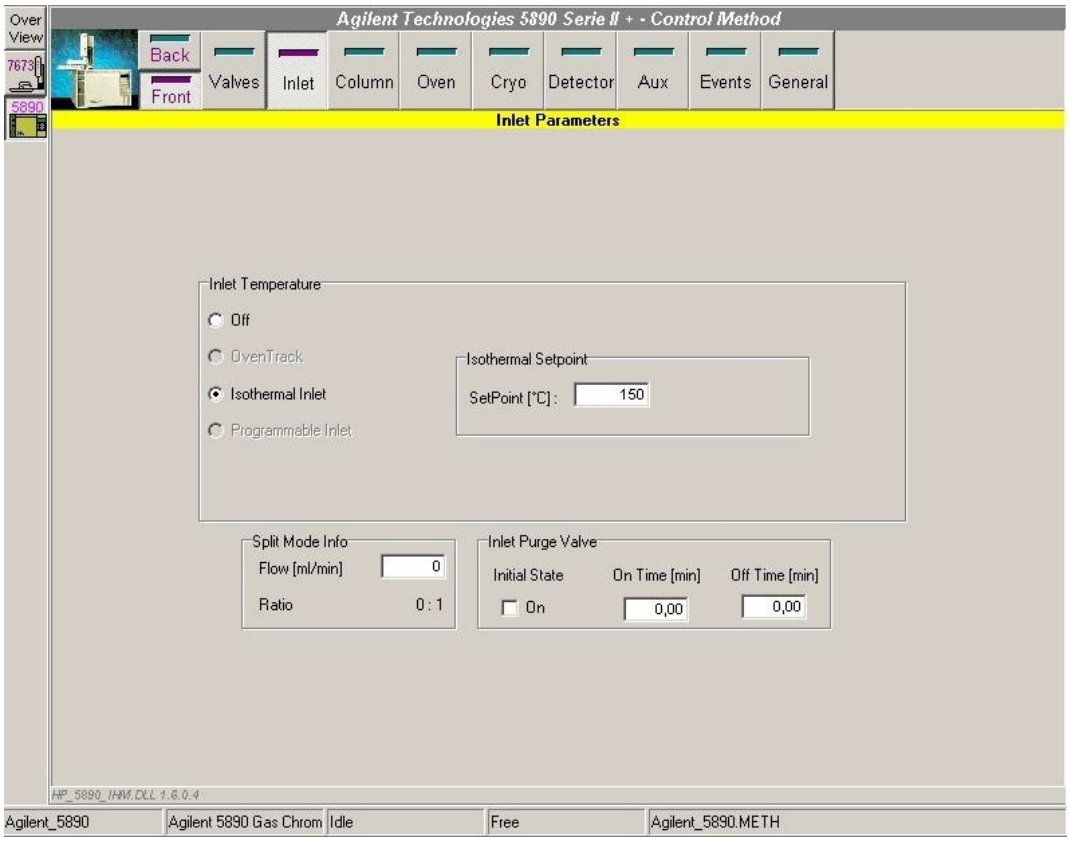
Valve 3 manages the splitless injection purge of the front inlet. Valve 4 manages the splitless injection purge of the back inlet.

NOTE: For Valve 3 and Valve 4, there is a link between the Valves window and the Inlet window. For instance, if Valve 3 is checked in the Valve window, the Inlet Purge Valve box in the Front Inlet window will be automatically checked. If the Inlet Purge Valve box in the Front Inlet window is checked, then Valve 3 will be automatically checked in the Valve window.

Inlet Control

Depending on the system configuration, the Inlet sub-section contains one or two inlets: Front and/or Back. The activated fields also depend on the system configuration. Click on the inlet to edit (Front or Back).

Standard Inlet



Inlet Temperature Parameter Group

Select Off to turn off the inlet heater.

Select *Isothermal Inlet* to have a constant inlet temperature. Enter the setpoint value in the *Isothermal Setpoint* field.

Split Mode Info Parameter Group

This parameter group appears only when an EPC option is configured on the corresponding inlet. Enter the split flow rate in the Flow field.

The *Ratio* is a read only field, automatically calculated according to the split flow and column flow.

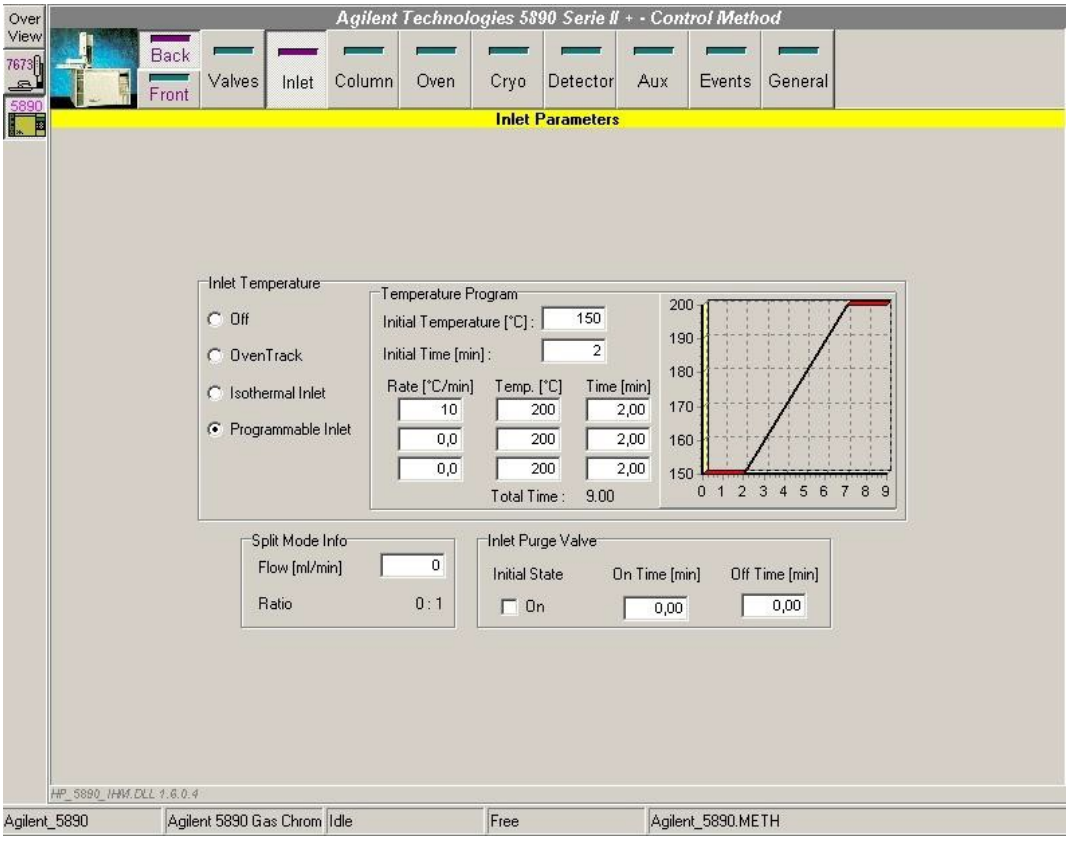
Inlet Purge Valve Parameter Group

Check *Initial state On* to turn the valve On (split mode) in the initial state. Enter the *On Time* and *Off Time* values during which the valve remains open.

The allowed range is 0 to 655 minutes but only the values which are lower than the run time will be taken into account. If both times are set to 0, the valves remain always open.

By default, the injection is realized in splitless mode (the *Initial State* box is unchecked).

PCOC Inlet



Inlet Temperature Parameter Group

Select *Off* to turn off the inlet heater.

Select *OvenTrack* to have the inlet temperature profile exactly like the column oven temperature profile.

Select *Isothermal Inlet* to have a constant inlet temperature. Enter the setpoint value in the *Isothermal Setpoint* field. Check *Programmable Inlet* to program the inlet temperature.

In the *Initial Temperature* field, enter the inlet initial temperature. In the *Initial Time* field, enter the time for this first plateau.

In the table program the rates, the plateau temperatures, and the time duration of the inlet plateau temperature. The total time of the inlet program is displayed in the *Total Time* field.

The graph to the right side of the table displays the inlet temperature program.

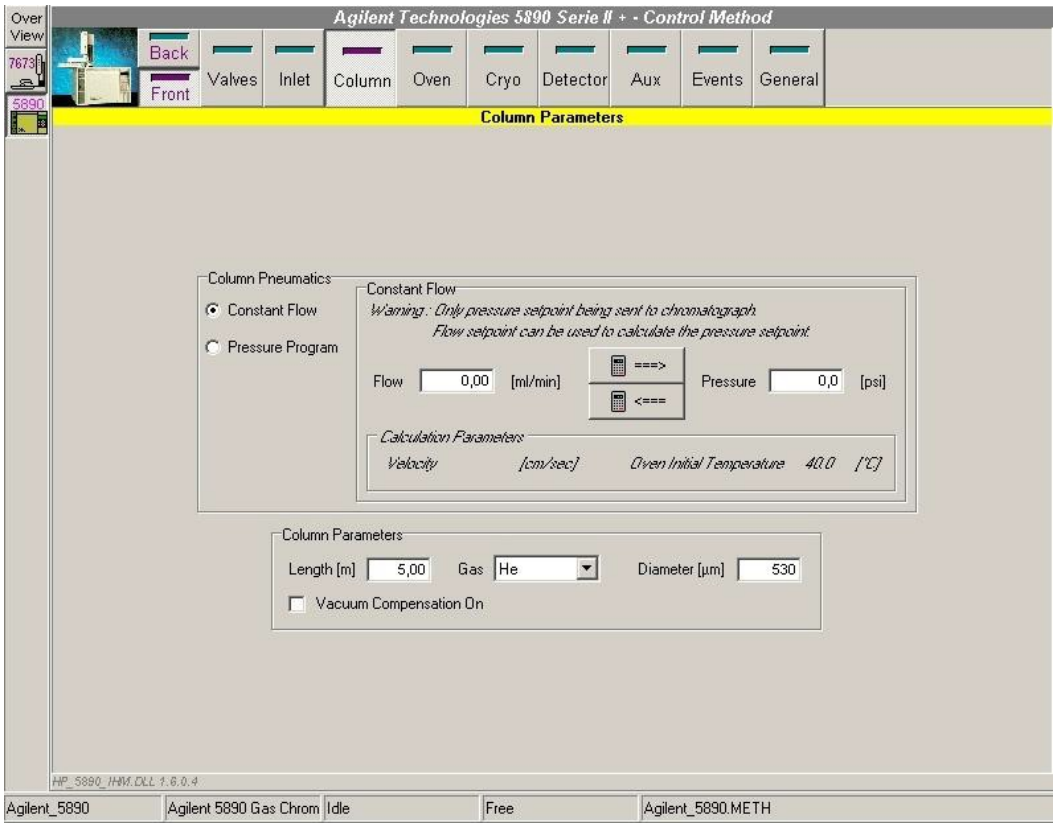
NOTE: The *Split Mode Info* and *Inlet Purge Valve* fields are inactive with an on-column inlet.

Column control

This sub-section is active only when an EPC is configured for the system in the CompassCDS Configuration Manager. In this case a *Constant flow* or a *Pressure program* can be entered.

The *Front* and *Back* and buttons allow you to specify the parameters for the two columns.

Constant flow



Column Pneumatics Parameter Group

Check *Constant Flow* to have a constant flow in the column. To maintain a constant flow, the pressure changes according to the oven temperature program.

Enter the *Flow* or the *Pressure* and click on or to calculate the corresponding pressure or flow.

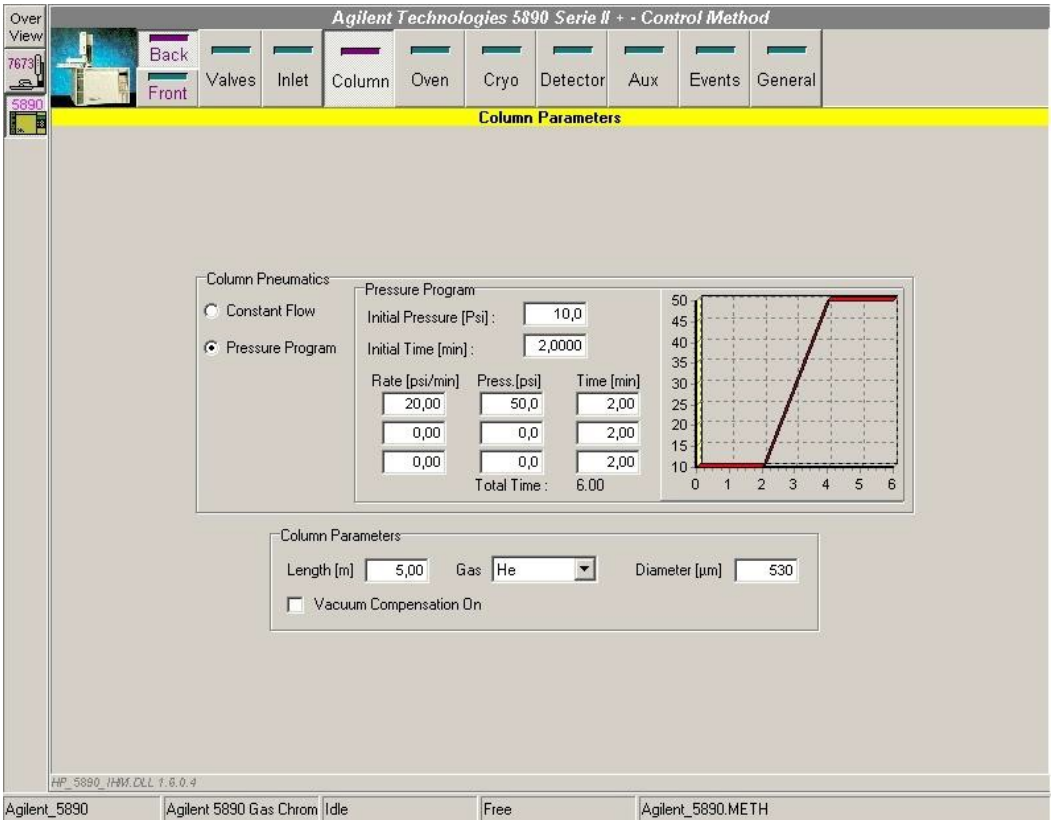
The *Velocity* and *Oven Initial Temperature* are a read-only display. The *Oven Initial Temperature* is displayed according to the *Initial Temperature* field of the *Oven* Tab.

Column Parameters Parameter Group

Enter the column *Length*, *Gas*, and *Diameter* in the corresponding fields. If these parameters and the *Oven Initial Temperature* are modified after the pressure calculation, click on the button again to update the column specification.

Check the *Vacuum Compensation On* box if the chromatograph is connected to a mass spectrometer, to correct the output pressure.

Program Pressure



Column Pneumatics parameter group

Check Pressure Program.

In the *Initial Pressure* field, enter the column initial pressure. In the *Initial Time* field, enter the time for this first plateau.

In the table program the rates, the plateau pressure, and duration of the plateau pressure. The total time of the column program is displayed in the *Total Time* field.

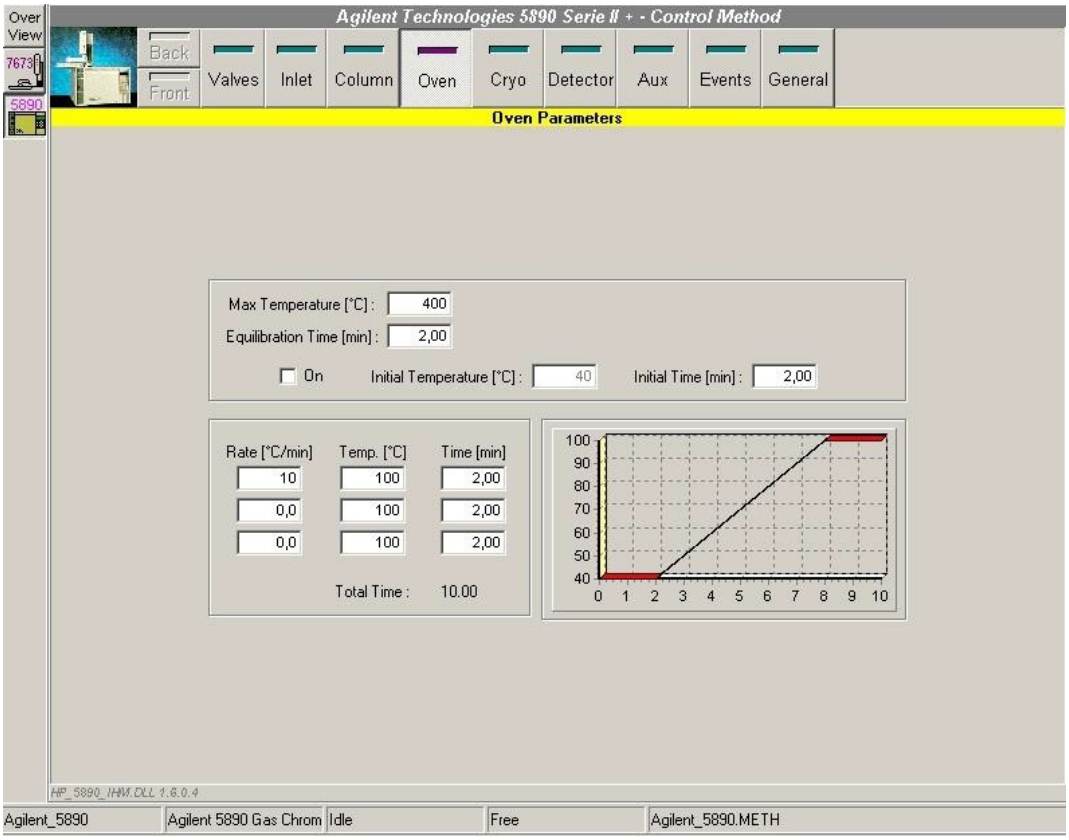
The graph to the right of the table displays the pressure program.

Column Parameters parameter group

Enter the column *Length*, *Gas*, and *Diameter* in the corresponding fields.

Check the *Vacuum Compensation On* box if the chromatograph is connected to a mass spectrometer, to correct the output pressure.

Oven Control



In the *Max Temperature* field, enter the column maximum temperature.

In the *Equilibration Time* field, enter the time before the GC becomes Ready. Check the *On* box to activate the oven temperature program.

In the *Initial Temperature* field, enter the oven initial temperature. In the *Initial Time* field, enter the time for this first plateau.

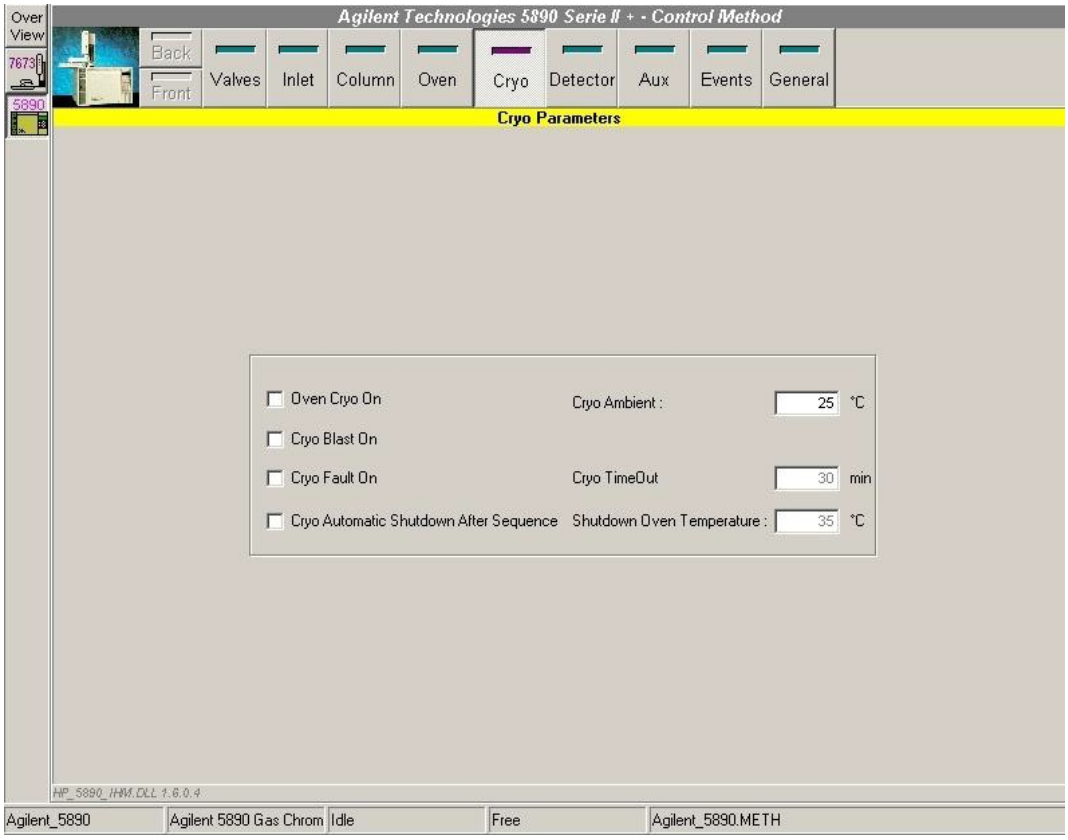
In the table program the rates, the plateau temperatures, and the duration of the column oven plateau temperature. The total time of the oven program is displayed in the *Total Time* field.

The graph to the right side of the table displays the oven temperature program.

Cryo Control

This sub-section is active only when a Cryogenic option is configured for the system in the CompassCDS Configuration Manager.

Click on the *Cryo* button, the *Cryogenic Parameters* screen appears. The cryogenic system generates an oven temperature lower than the ambient temperature. The fields shown depend on the configuration.



Check the *Oven Cryo On* box to activate the cryogenic system. Enter the ambient temperature in the *Cryo Ambient* field.

Check *Cryo Blast On* to quickly cool the oven after a run.

Check *Cryo Fault On* to stop the oven after 17 minutes if the cryogenic system has not reached the desired temperature. The oven stops if no injection is started before the time entered in the *Cryo Timeout* field.

Check *Cryo Automatic Shutdown After Sequence* to stop the cryogenic system use at the end of a sequence. In the

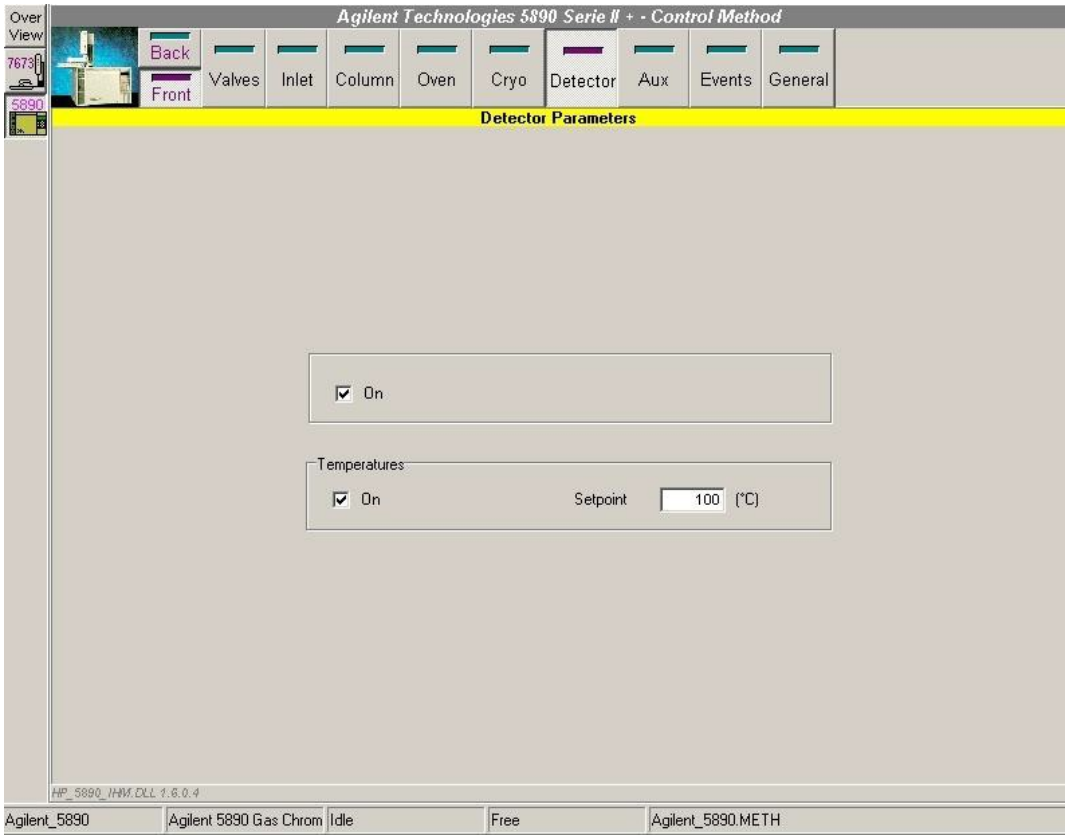
Shutdown Oven Temperature field, enter the temperature the oven has to reach at the end of the sequence.

Detector Control

Click on the *Front* or *Back* buttons to enter the parameters for each installed detector.

FID (Flame Ionization Detector), ECD (Electron Capture Detector), FPD (Flame Photometric Detector) and NPD (Nitrogen-Phosphorous Detector)

For these four detectors, the available parameters to be set are identical.

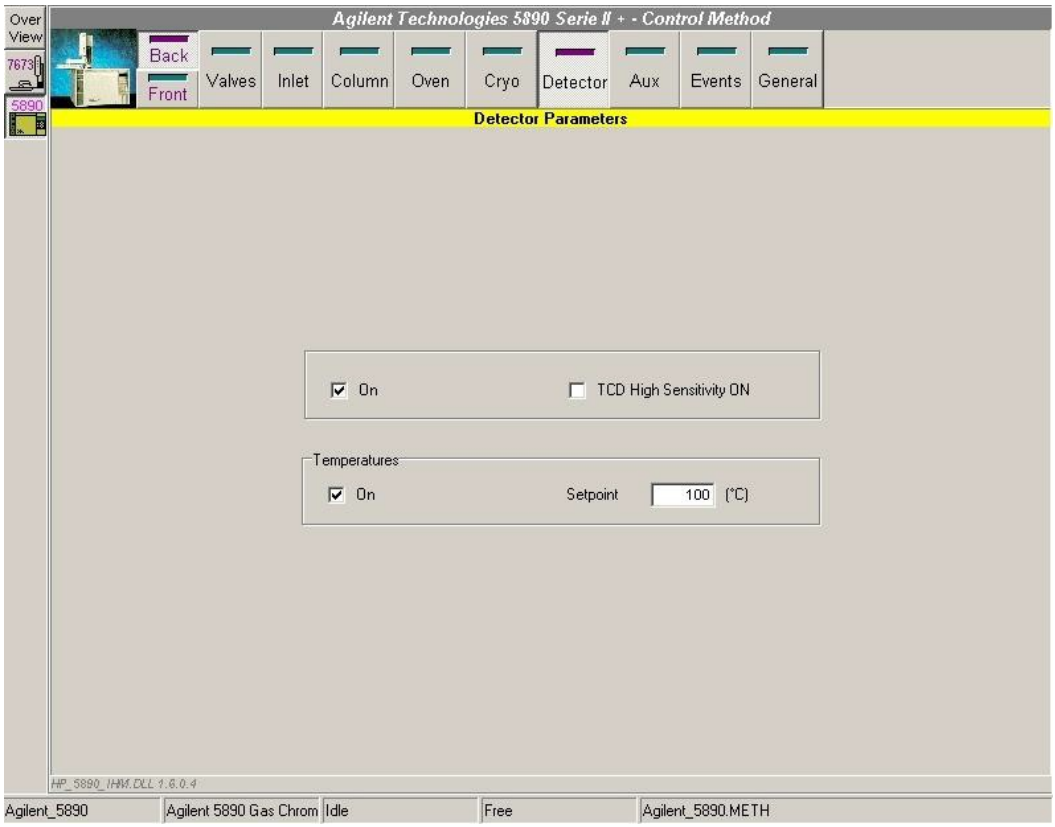


Check *On* to activate the detector.

Temperatures parameter group

Check *On* to set the detector temperature in the *Setpoint* field.

TCD (Thermal Conductivity Detector)



Check *On* to activate the detector.

Check *TCD High Sensitivity ON* when the analyzed compound concentration is lower than 10%. The signal is saturated when the concentration is greater.

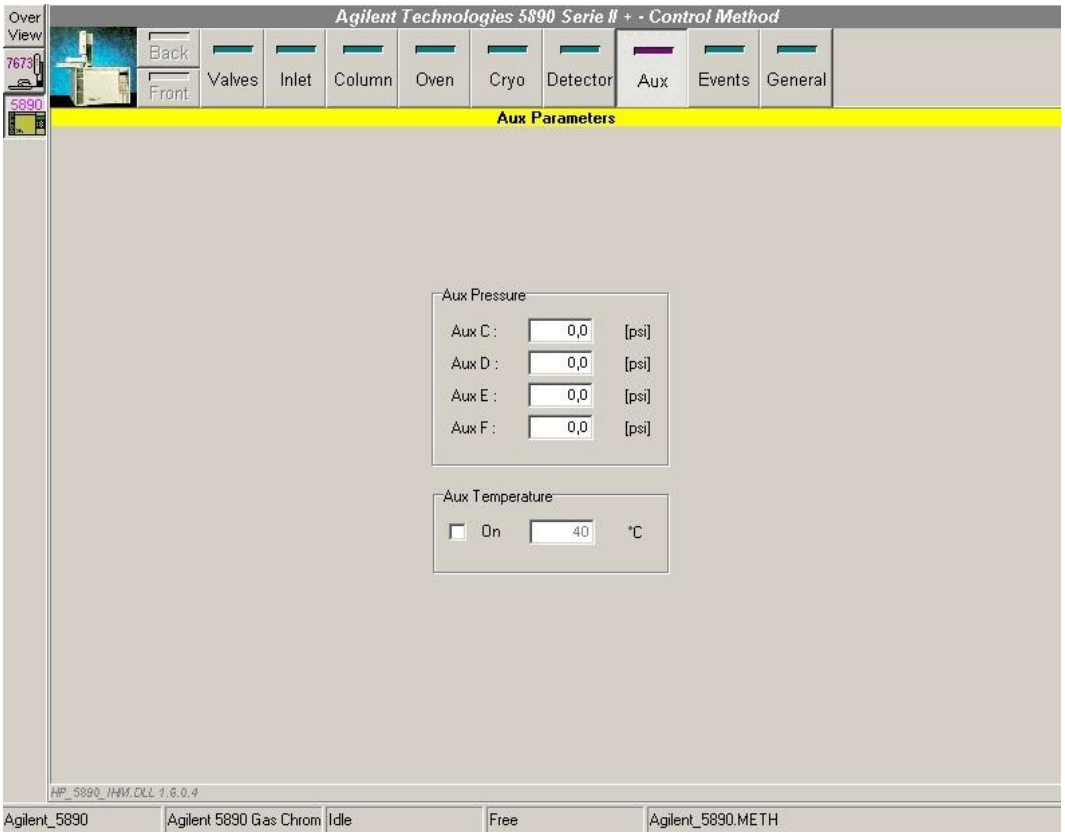
Temperatures parameter group

Check *On* to set the detector temperature in the *Setpoint* field.

Aux Control

The Agilent 5890 Series II+ gives the choice to have an extra heating block and four auxiliaries (*Aux C*, *D, E*, and *F*).

This sub-section is active only when at least one auxiliary is configured for the system in the CompassCDS Configuration Manager. The different fields depend on system configuration.



Aux Pressure Parameter Group

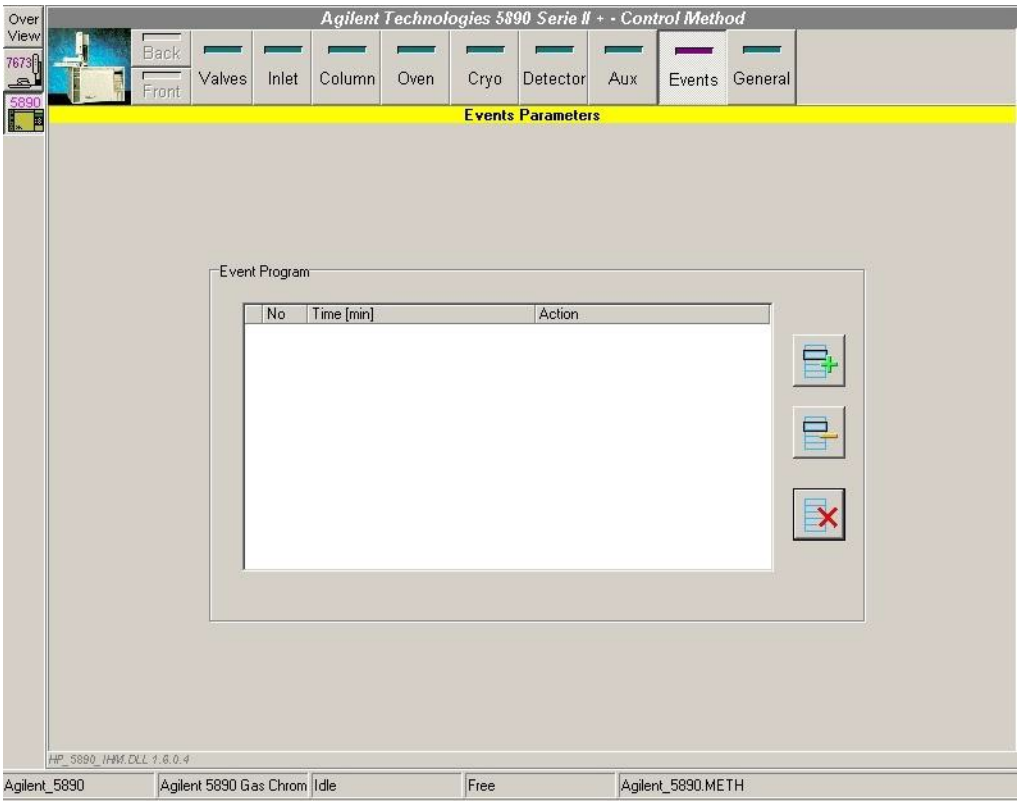
These four auxiliaries allow control of the detector gas flow (make-up gas, carrier gas, and fuel gas), the external sampler gas flow (type ‘purge and trap’ or ‘headspace’), and the optional ‘gas saver’ for split/splitless mode.

Enter the pressure values corresponding to the auxiliaries.

Aux Temperature Parameter Group

Check *On* to turn on the heater and enter the auxiliary temperature.

Events Control



This table allows to program events like valve switching, TCD polarity, signed on/off, etc.

NOTE: If the valve switching is programmed with the event table, it is better to program the initial position of the valve at the end of the analysis.

Use the following buttons to edit the table:

to add a line to the table. to delete a line in the table. to clear the entire table.

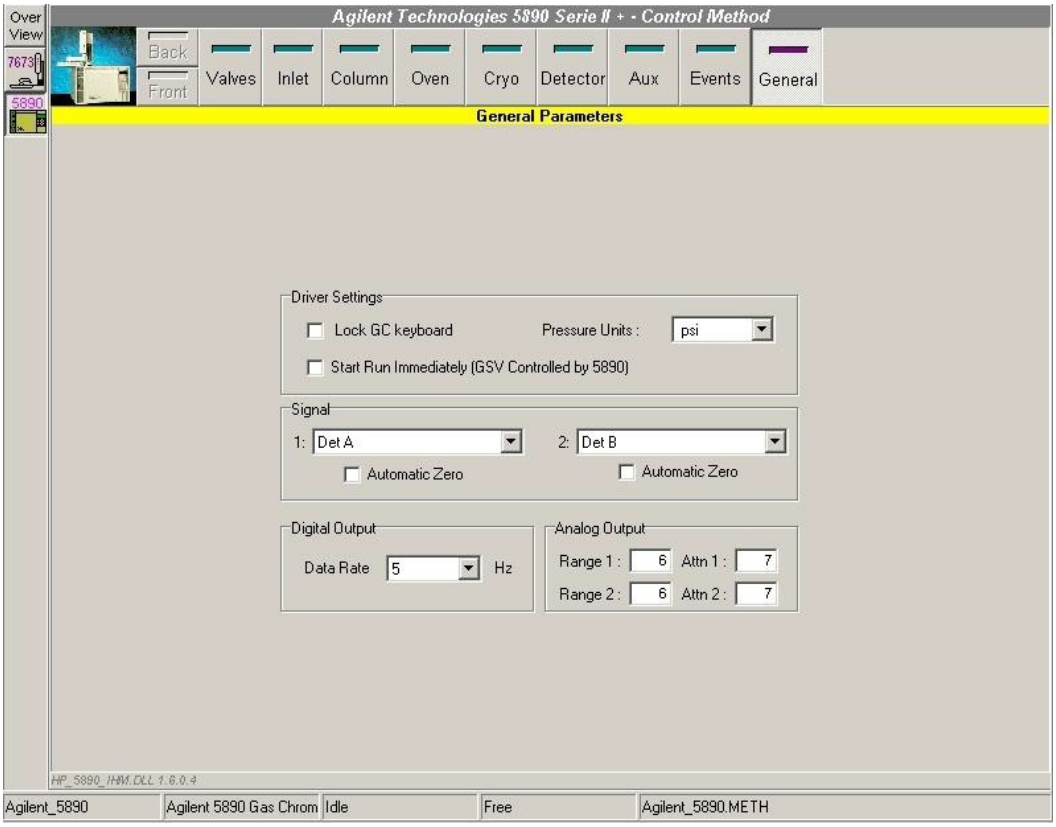
In the column *No*, the number of the line is displayed.

In the column *Time*, enter the time when the action has to be done.

In the column *Action*, select the action to do. The available choices are:

TCD A Low	TCD A Invert Polarity	Valve 3 ON
TCD A High	TCD B Invert Polarity	Valve 3 OFF
TCD B Low	Valve 1 ON	Valve 4 ON
TCD B High	Valve 1 OFF	Valve 4 OFF
Signal Switch ON	Valve 2 ON	
Signal Switch OFF	Valve 2 OFF	

General Control



Driver Settings Parameter Group

Check *Lock GC keyboard* to avoid control parameter modification directly on the chromatograph. The START and STOP keys are operational even when this option is checked.

Check *Start run immediately* to launch an analysis as soon as the GC is ready (in the case of GSV gas sampling valve) without starting it manually.

In the *Pressure Units* area, use the scrolling list to choose the units. The available choices are: psi, bar, kPa.

NOTE: This setting is used for displaying and entering the pressures in the control method subsections described earlier.

Signal Parameter Group

In the field *1* and/or *2*, choose the appropriate signal with the scrolling lists. The available choices are:

Det A	Det B- Comp1	Inlet B Temp
Det B	Det A-Comp 2	Det A Temp
Det A-	Det B- Comp 2	Det B Temp
Det B	Oven Temp	Flow A
Det B-	Comp 1	Flow B
Det A	Comp 2	Test Plot
Det A-Comp 1	Inlet A Temp	

Check *Automatic Zero* (for channel 1 and/or 2) to take into account the background noise and subtract this value from the signal.

Digital Output Parameter Group

In the *Date Rate* field, select the acquisition frequency. The available choices are: *1.25Hz*, *2.5Hz*, *5Hz*, *10Hz* and *20Hz*.

Analog Output Parameter Group

In the *Range* and *Attn* fields, enter the range and attenuation values. These output parameters are valid for analog acquisition. The values depend on the detector installed.

Starting and Viewing an Acquisition

Quick Start and Sequence

Once the instrument control method has been correctly programmed, an analysis can be started. The next section briefly describes how to start an acquisition.

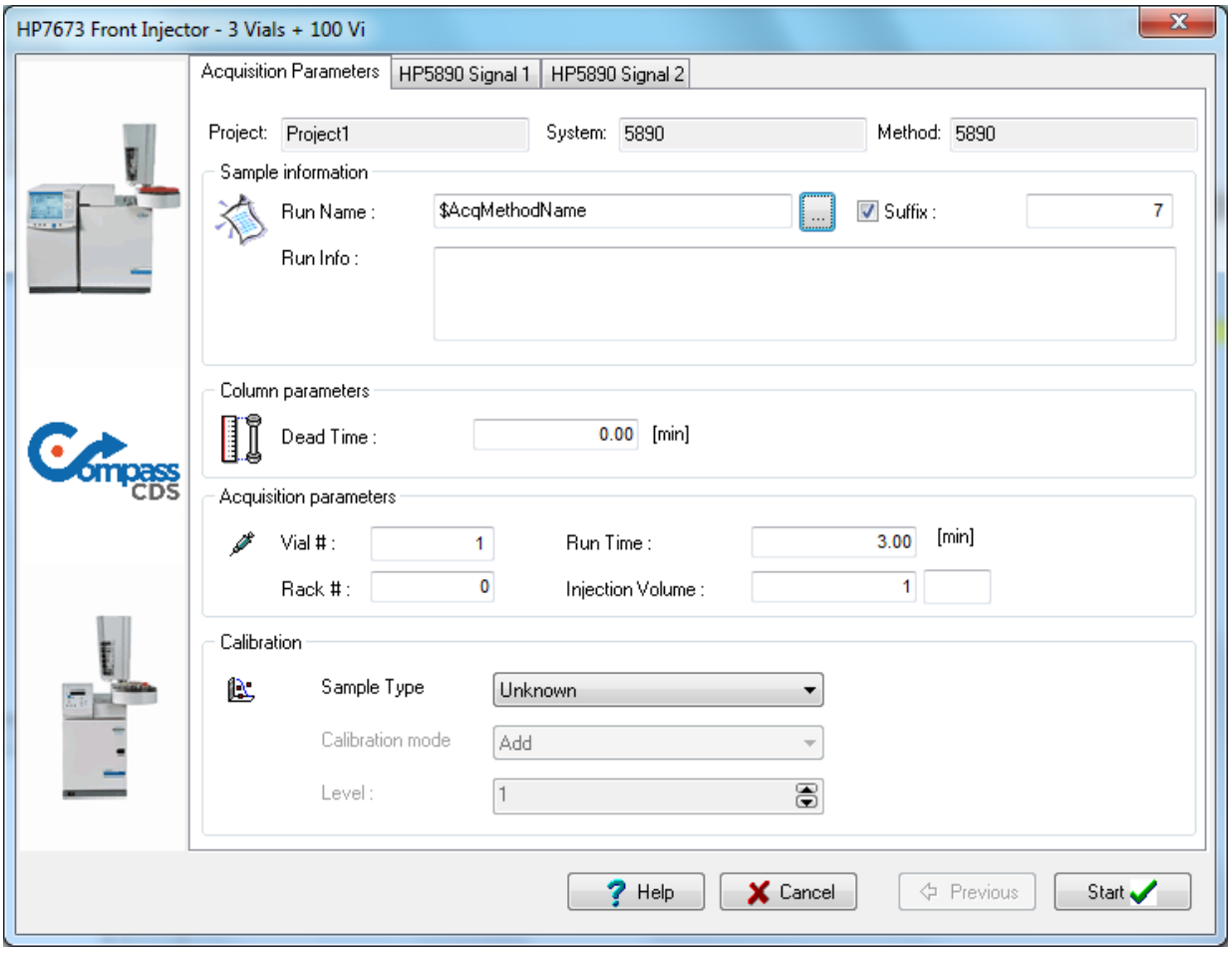
Quick Start (Single Acquisition)

1. Press the button.

   In the Quick Start window, select the system, the method and optionally the project if connected in "All project" mode.

2. Press the OK button.

   The following screen is displayed:



In the *Acquisition parameters* tab, required fields like the *Run Name*, the *Run ID* and the *Acquisition length* must be filled in before starting an analysis. Furthermore, if the system is equipped with an autosampler controlled by the CompassCDS Chromatography Data System, the *Injection Volume*, the *Vial* position and the *Rack* number (if required) must be entered.

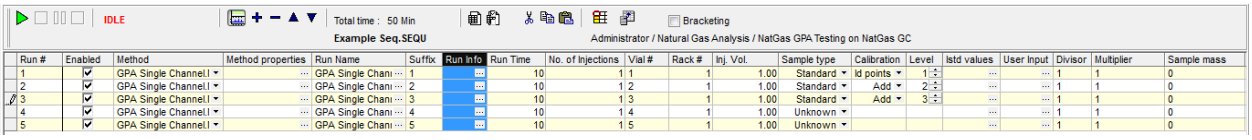
Other parameters associated with each acquisition channel can be entered in the *Channel X* tab.

Click on the Start button to start the acquisition if the system is a single-injector system or click on the Next button if the system is a multiple injector system. In a multiple injector system, the same parameters entered for the first injector must be entered for the other injectors before starting the acquisition.

Sequence

1. To create a sequence, select the FILE / NEW SEQUENCE menu, and complete the displayed creation wizard screen (refer to the CompassCDS Chromatography Data System User Guide), by entering the system name that will perform the analysis, the number of lines (corresponding to the number of samples), and the sequence name.

2. The sequence is displayed. Complete the sequence information columns (refer to the CompassCDS Chromatography Data System User Guide).



Run #	Enabled	Method	Method properties	Run Name	Suffix	Run Info	Run Time	No. of Injections	Vial #	Rack #	Inj. Vol.	Sample type	Calibration	Level	Istd values	User Input	Divisor	Multiplier	Sample mass
1	☑	GPA Single Channel.I	...	GPA Single Chan	1	...	10	1	1	1	1.00	Standard	Id points	1	...	...	1	1	0
2	☑	GPA Single Channel.I	...	GPA Single Chan	2	...	10	1	2	1	1.00	Standard	Add	2	...	...	1	1	0
3	☑	GPA Single Channel.I	...	GPA Single Chan	3	...	10	1	3	1	1.00	Standard	Add	3	...	...	1	1	0
4	☑	GPA Single Channel.I	...	GPA Single Chan	4	...	10	1	4	1	1.00	Unknown			...	...	1	1	0
5	☑	GPA Single Channel.I	...	GPA Single Chan	5	...	10	1	5	1	1.00	Unknown			...	...	1	1	0

The Method Name, the Run Name, the Run ID, and the Acquisition length must be filled in before starting the analysis. All these parameters are automatically imported from the acquisition part if defined in the method.

3. Start the sequence by clicking on the button.

NOTE: For more details about how to start an acquisition, refer to the CompassCDS Chromatography Data System User Guide.

NOTE: The volume that will be injected depends of the syringe size. Only five levels of injection volume can be programmed for this driver in the Acquisition sub-method part: 1, 2, 3, 4 and 5. These values represent the number of tenths of the syringe volume. For example if the entered volume is 3 and the syringe volume is 10 µL, the injected volume will be 3 tenths of 10 µL=3 µL. A physical turret option called *Nanoliter* allows the injection of smaller volume (refer to the Agilent manual to learn more about this option). Refer to the Appendix (*Injection Volumes* section) to see the correspondence between the programmed levels and the real injected volumes.

Running Acquisition Status

Viewing a Running Acquisition

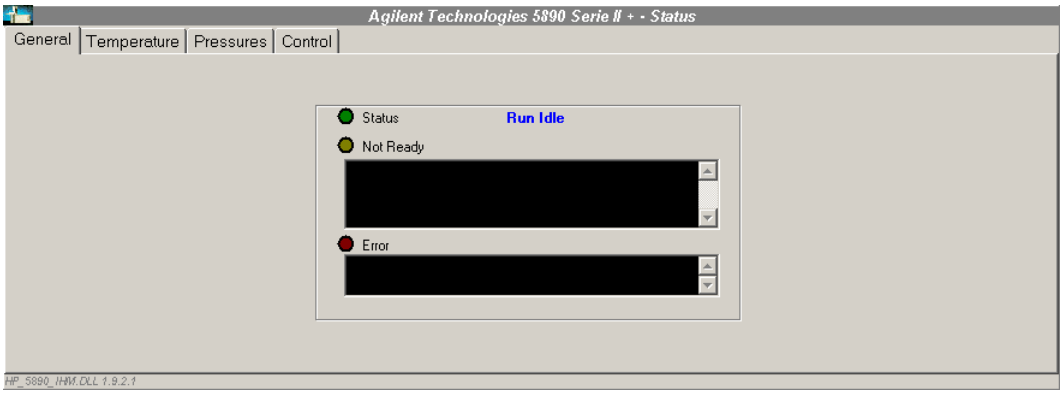
To view a running acquisition, click on the *Systems* tab then select the running system. A window is activated which is composed of two parts: the running chromatogram and the status window where the driver modules are listed.

Status of the Agilent 5890 Gas Chromatograph

Click on the

button corresponding to the Agilent Technologies 5890 Gas Chromatograph driver and the Agilent Technologies 5890 Gas Chromatograph status screen will appear. It contains three sub-sections: *General*, *Temperatures* and *Control.* Depending on the system configuration, a *Pressures* sub-section can be displayed if an EPC or a pressure auxiliary option has been configured. Click on the required sub-section to display the corresponding screen.

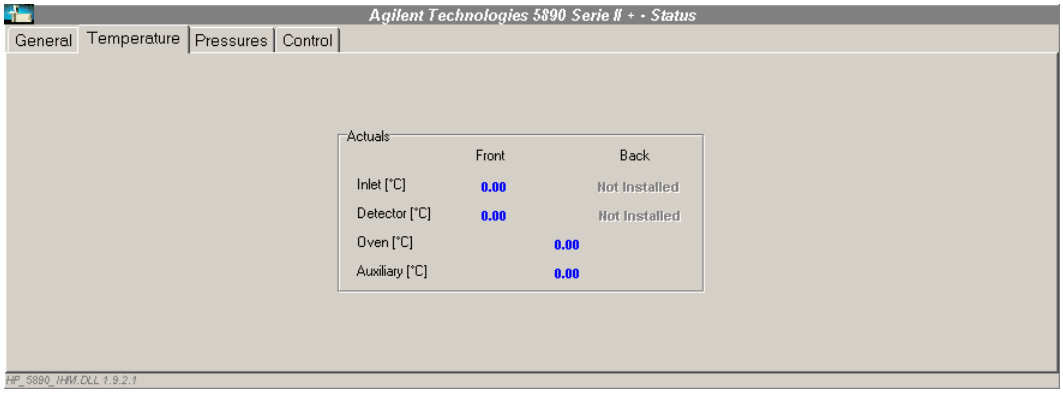
General Window



This is a read-only window.

Information about the instrument status is displayed: Faults, not ready parameters, etc.

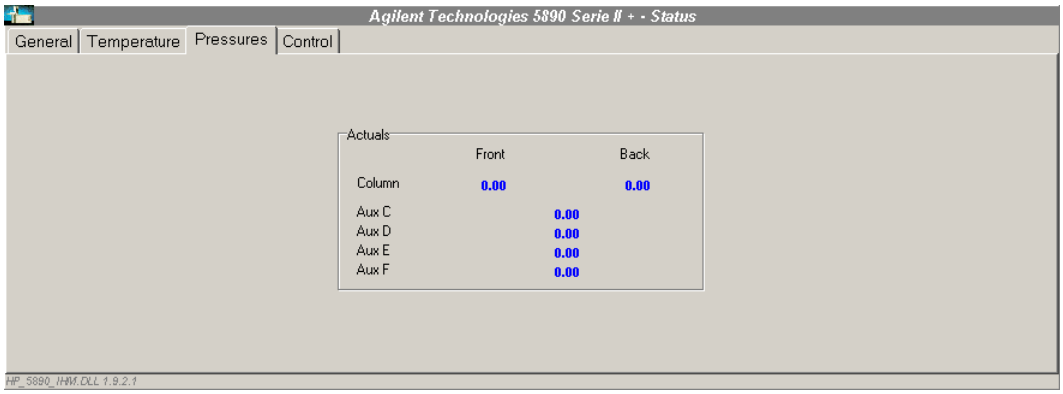
Temperatures Window



This is a read-only window.

The temperatures of the detector(s), inlet(s), oven and auxiliary are displayed.

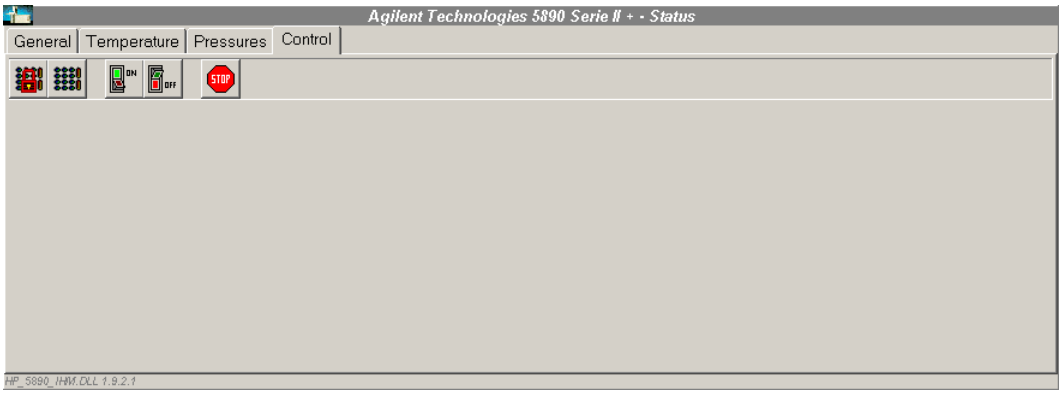
Pressures Window



This is a read-only window.

The pressure in the column(s) and in the auxiliary(ies) is displayed.

Control Window



This window allows direct control of the 5890 GC. The button locks the chromatograph keyboard.

unlocks the chromatograph keyboard.

turns on the 5890 GC

turns off the 5890 GC.

stops the chromatograph.

NOTE: All the direct control buttons are deactivated during a run.

Appendix

Injection Volumes

The volume that will be injected depends of the syringe size. Only five levels of injection volume can be programmed for this driver in the Acquisition sub-method part: 1, 2, 3, 4 and 5. These values represent the number of tenths of the syringe volume. For example if the entered volume is 3 and the syringe volume is 10 µL, the injected volume will be 3 tenths of 10 µL = 3 µL. A physical turret option called Nanoliter allows the injection of smaller volume (refer to the Agilent manual to learn more about this option). The following table gives the injected volumes according to the value entered in the Acquisition sub-method part.

Nanoliter Option	Off		On	
	Entered Value	Injected Volume	Entered Value	Injected Volume
5 µL Syringe	1	0.5	1	0.1
	2	1.0	2	0.5
	3	1.5	3	1.0
	4	2.0	4	1.5
	5	2.5	5	2.0
10 µL Syringe	1	1.0	1	0.2
	2	2.0	2	1.0
	3	3.0	3	2.0
	4	4.0	4	3.0
	5	5.0	5	4.0
25 µL Syringe	1	2.5	1	0.5
	2	5.0	2	2.5
	3	7.5	3	5.0
	4	10.0	4	7.5
	5	12.5	5	10.0
50 µL Syringe	1	5.0	1	1.0
	2	10.0	2	5.0
	3	15.0	3	10.0
	4	20.0	4	15.0
	5	25.0	5	20.0
100 µL Syringe	1	10.0	1	2.0
	2	20.0	2	10.0
	3	30.0	3	20.0
	4	40.0	4	30.0
	5	50.0	5	40.0

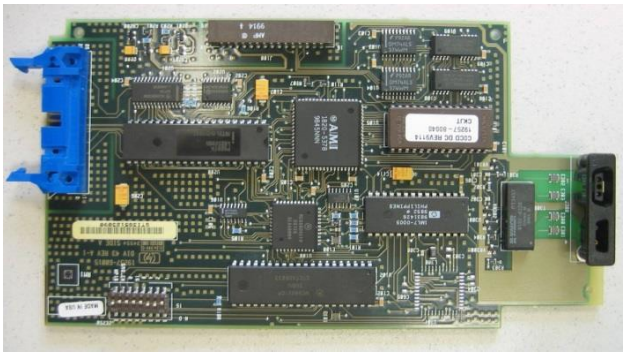
Configuring a 5890 GC to CompassCDS

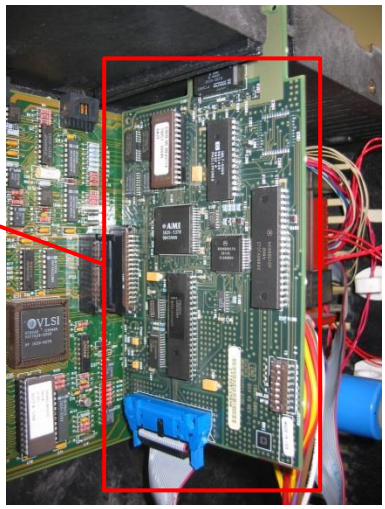
Every 5890 that will be controlled by CompassCDS must have the HPIB/RS232 communication kit installed.

If the GC was formerly controlled by Agilent Chemstation, it will have the HPIB/RS232 communication kit already installed.

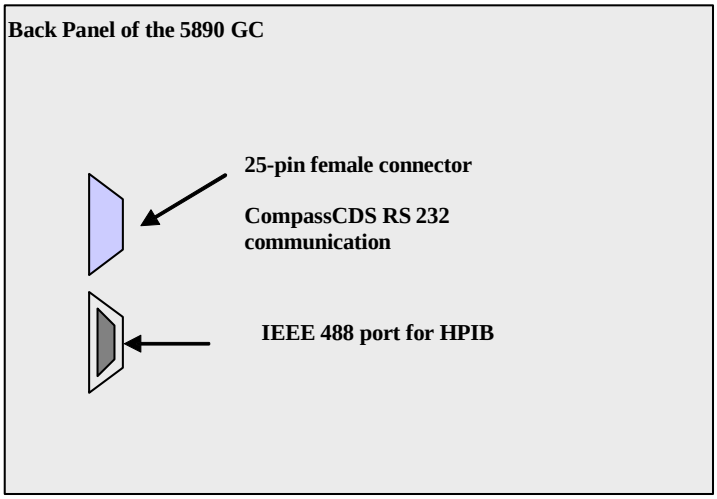
This kit contains three parts:

- a board on the right-hand side of the GC. To access this board, remove the right panel of the GC (tightened by 4 screws) as shown below :





- Connectors on the back of the GC : The back of the GC has 2 connectors : an IEEE 488 connector used by Agilent Chemstation for HPIB communication, and a 25-pin RS 232 female connector used for CompassCDS RS 232 control.



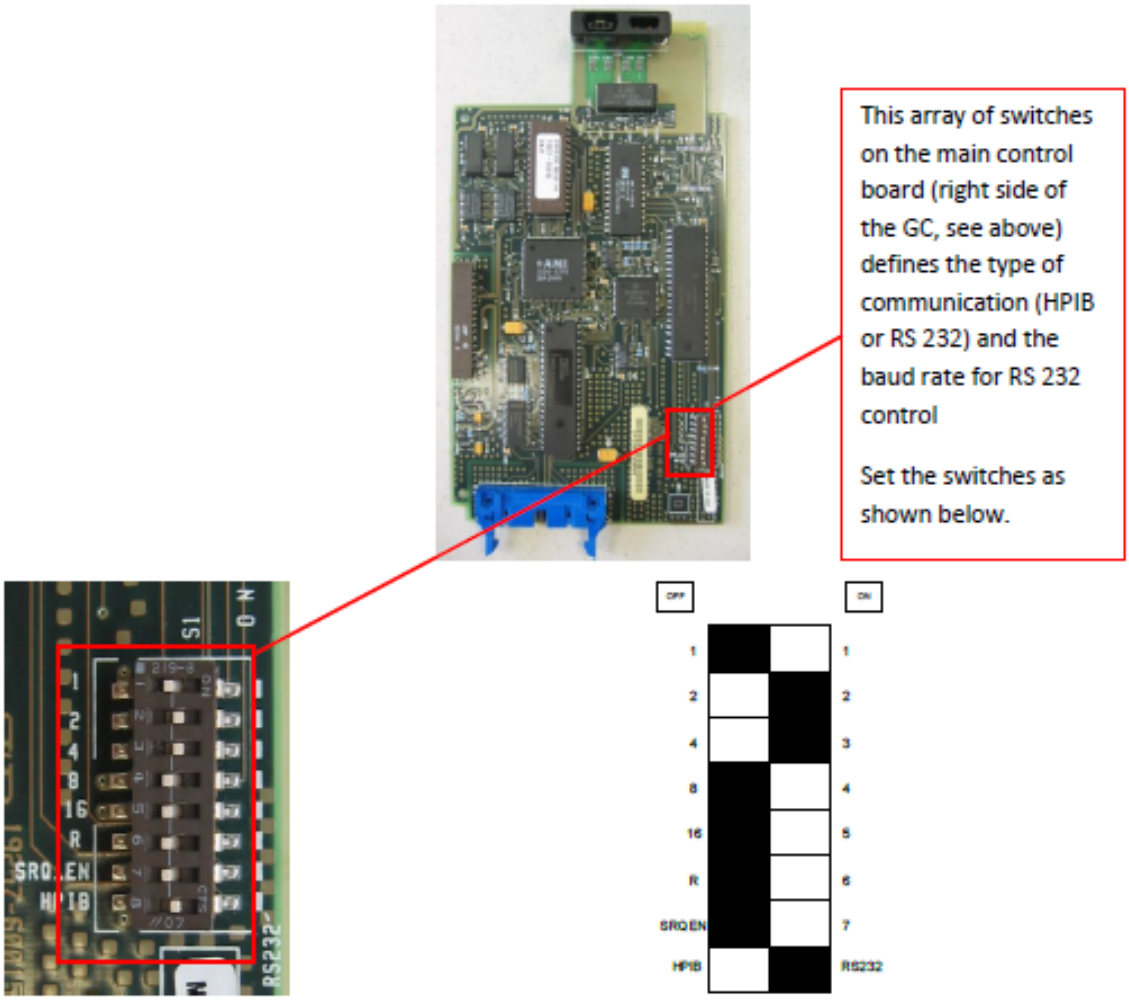
- Connectors on the top of the GC: Be sure to connect the 82167-60002 Agilent part number cable in the “Instrument Network Out/In” plugs (this connection is necessary for [CompassCDS starting when the GC starts).

Setting and Configuration

When connected to Chemstation, the GC is set up for communication with IEEE488 (HPIB) interface. The RS232 baud rate is by default not set on the GC.

To set it to the proper value for CompassCDS (9600 bauds), do the following steps:

Step 1: Power-off the GC and configure the switches on the control board as shown below



Step 2: Verify the baud rate on the GC

Power on the GC again, and hold the [**clear**] key pressed during GC initialization. The message « **User Test Sel 0..7** » will appear.

Press [**4**] : the GC will display « **RS232 baud = 9600** ».

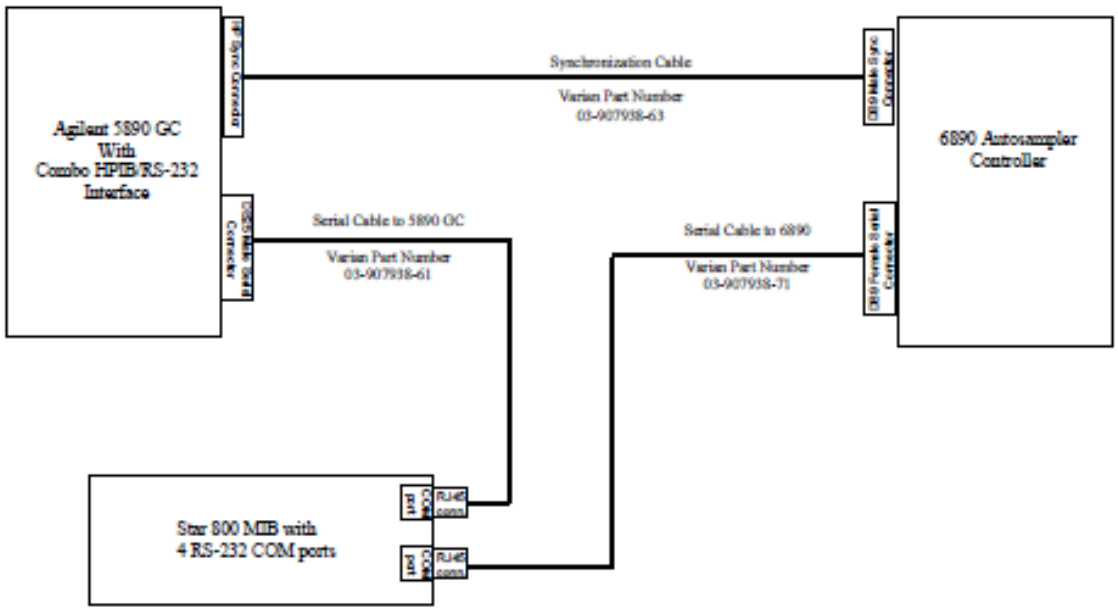
If the GC does not display this message, verify the configuration of the switches on the board (see above)

Wiring Connections between CompassCDS and the 5890 GC with Autosampler

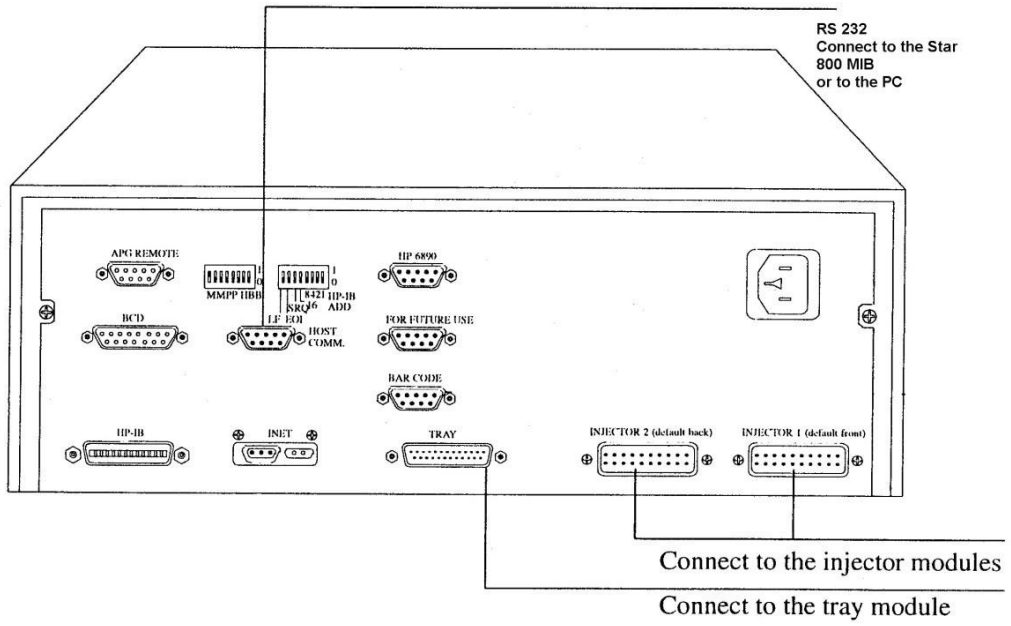
Depending on which autosampler controller is used with the 5890 GC, the cables between the 5890 GC and the autosampler controller and the cables between the autosampler controller and the MIB-interface (or the PC) are different.

All the needed information is shown in the following drawings.

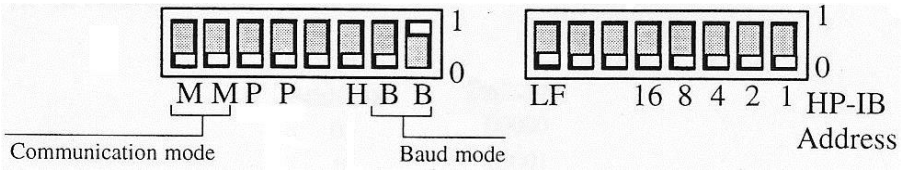
Agilent 5890 GC with 6890 Autosampler Controller Connected to MIB-interface COM ports



With this type of controller, only the communication switches must be set to define RS232 as communication mode and 9600 as baud rate.

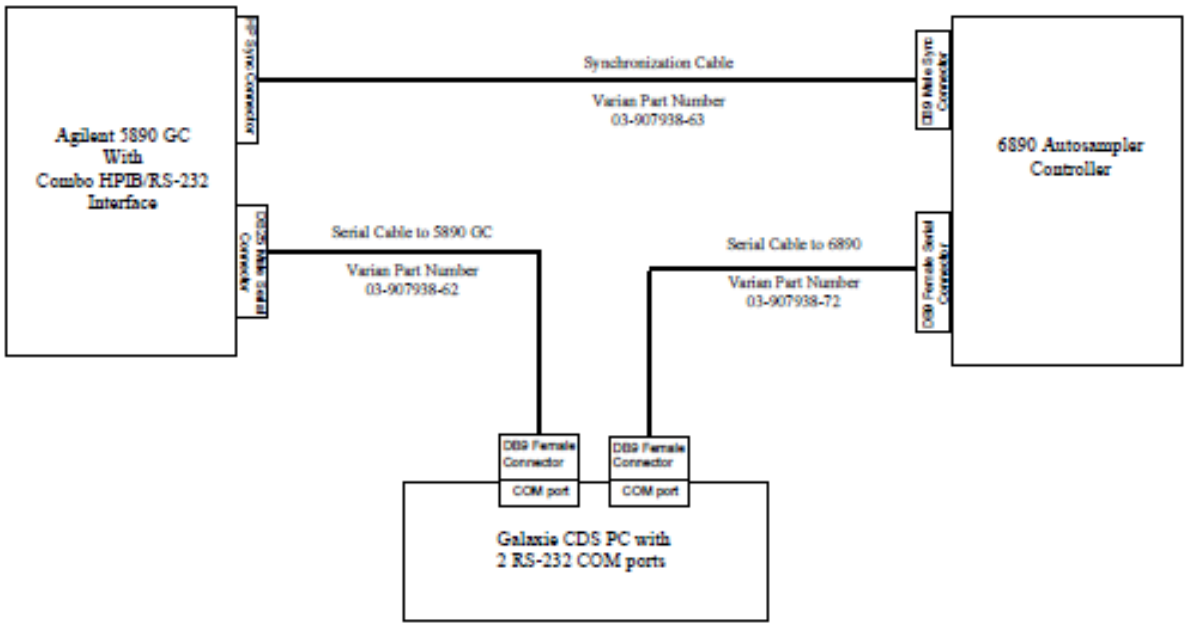


Make sure that the switches on the back of the controller are set up as shown.

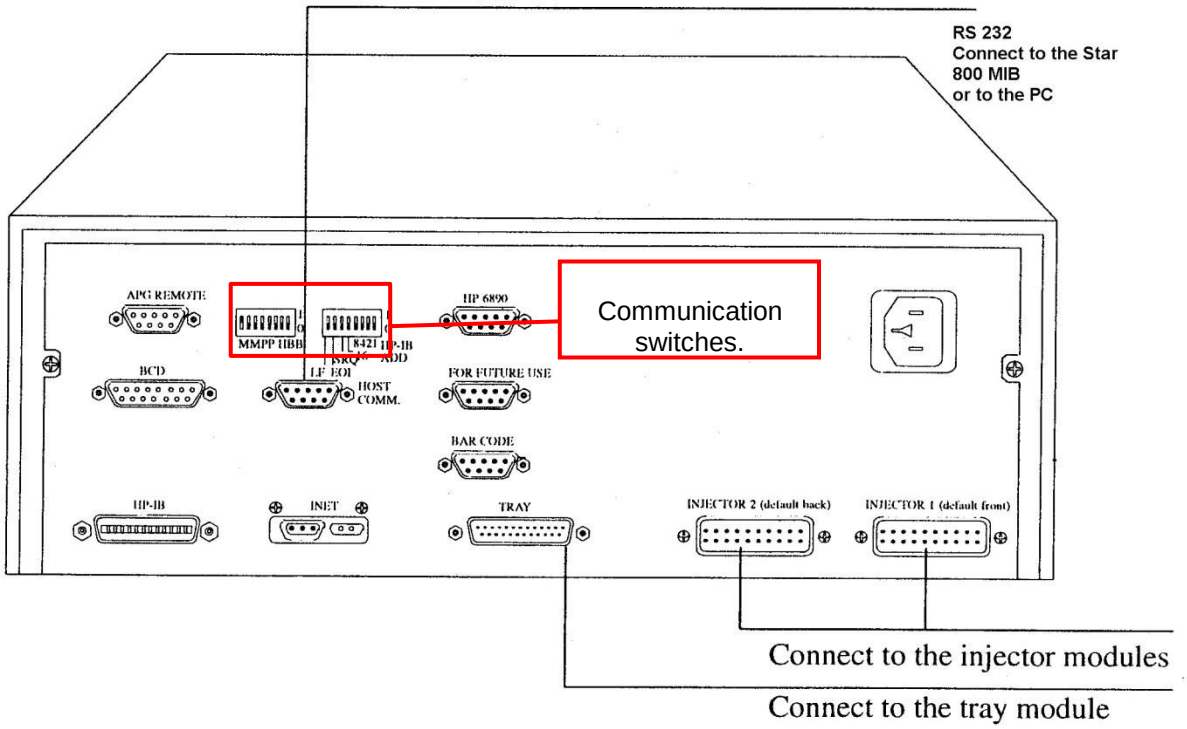


The communication cable from the controller to the MIB-interface (or the PC) must be plugged in the "**HOST COMM**" connector and the synchronization cable from the controller to the GC must be plugged in the "**Remote APG**" connector.

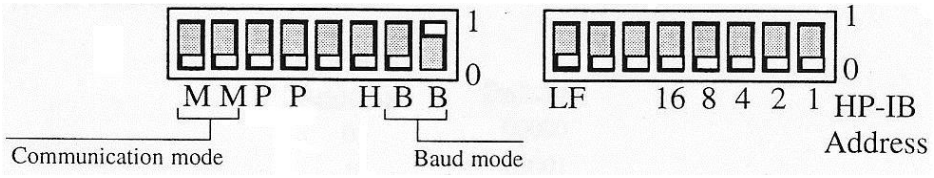
Agilent 5890 GC with 6890 Autosampler Controller Connected to PC COM ports



With this type of controller, only the communication switches must be set to define RS232 as communication mode and 9600 as baud rate.

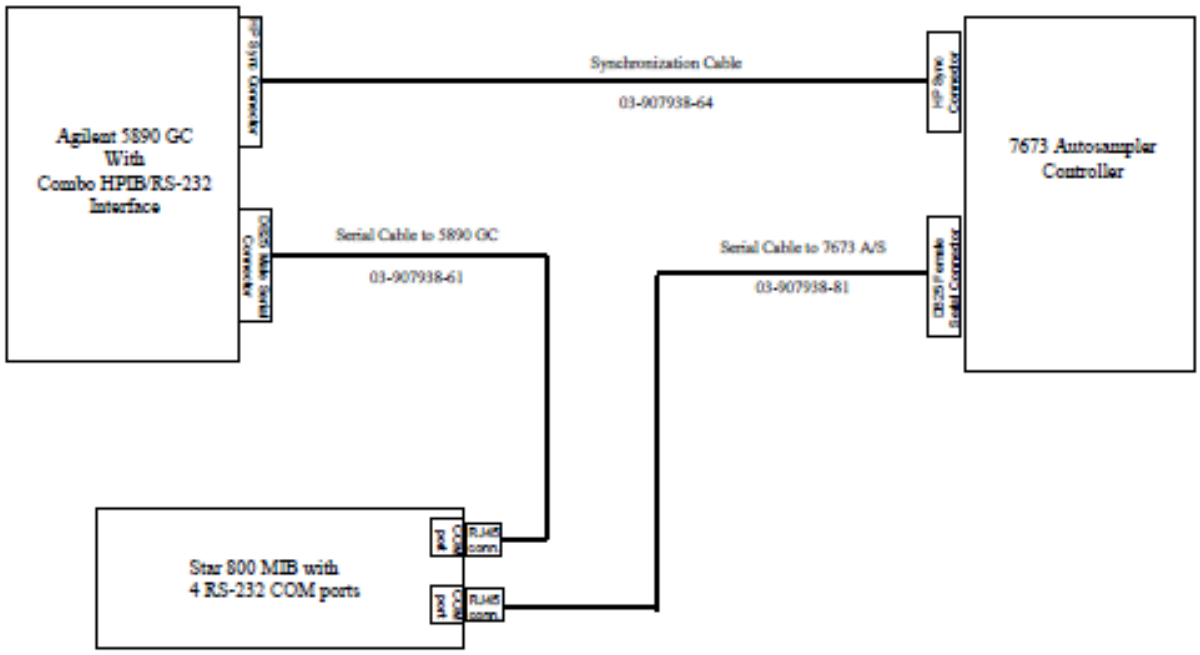


Make sure that the switches on the back of the controller are set up as shown.



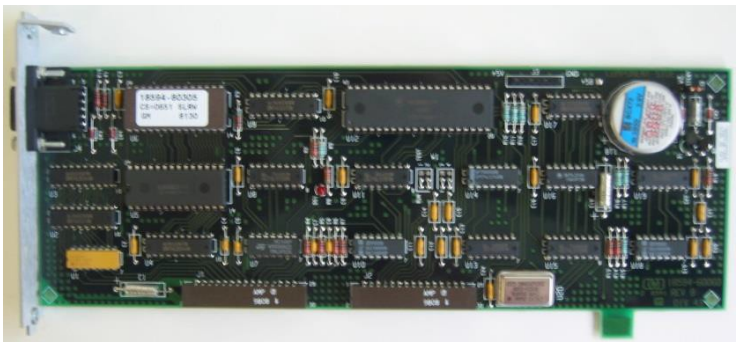
The communication cable from the controller to the MIB-interface (or the PC) must be plugged in the "**HOST COMM**" connector and the synchronization cable from the controller to the GC must be plugged in the "**Remote APG**" connector.

Agilent 5890 GC with 7673 Autosampler Controller Connected to MIB-interface COM ports



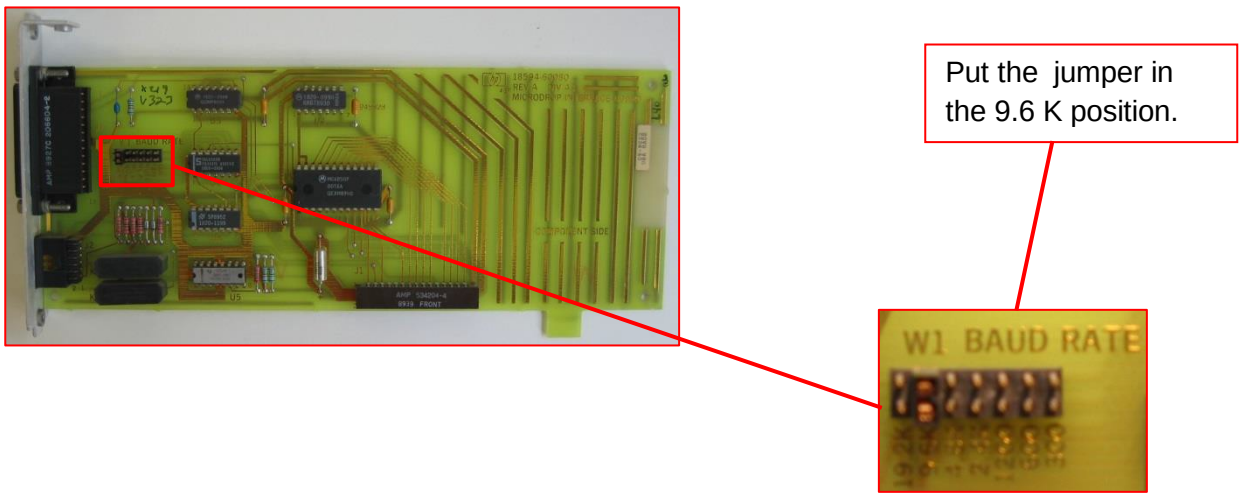
The autosampler controller mother card (*Controller* position in the 7673 controller) must be the one without GPIB connector on it to be able to communicate with CompassCDS (board reference HP_18594-60060). If not (for example the HP_18594-60110 card with a GPIB connector on it), you will not be able to communicate with the autosampler.

NOTE: The synchronization cable is no longer needed since version 1.11.1.6 of the 7673 autosampler. If upgrading the driver of the 5890 to a version greater or equal to the 1.14.1.1, remove this cable.

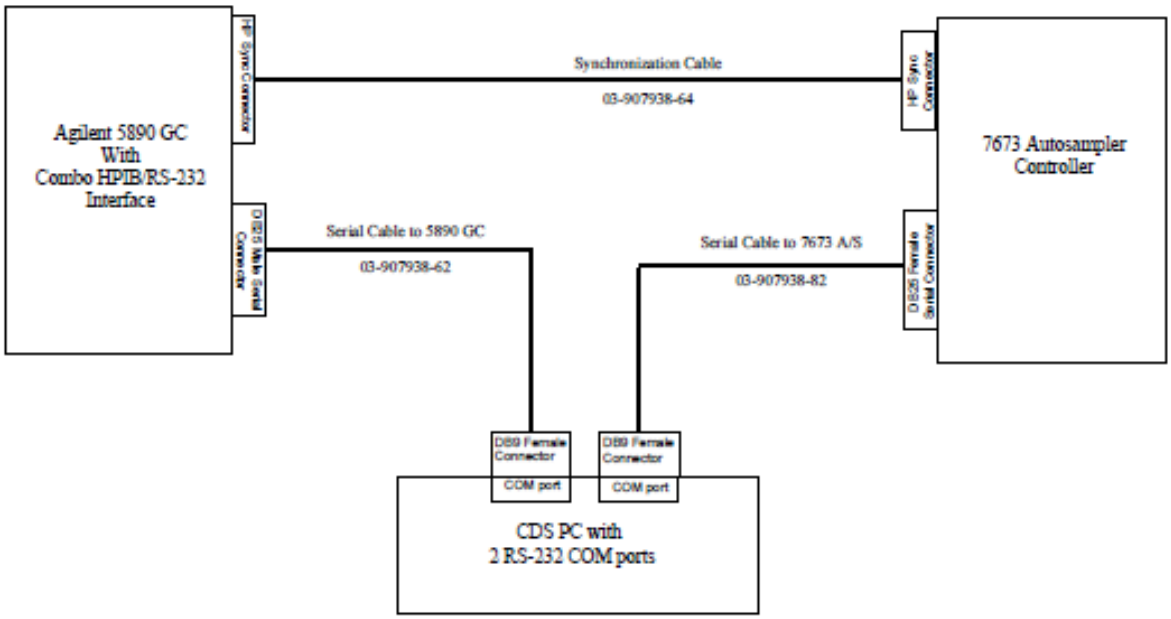


Controller board without GPIB (ref: HP_18594-60060)

Furthermore, the jumper on the *Communication* board of the autosampler must in the position 9.6K as shown below.

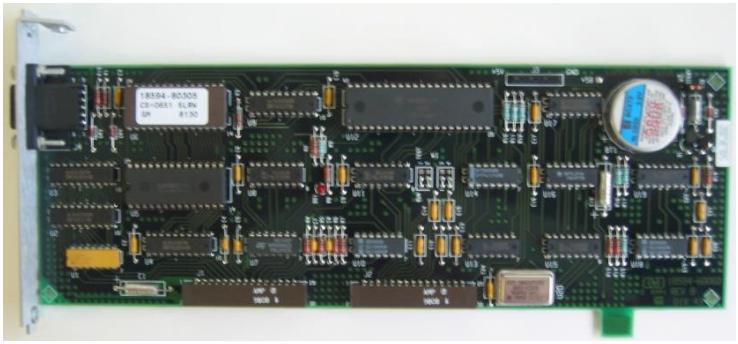


Agilent 5890 GC with 7673 Autosampler Controller Connected to PC COM ports



The autosampler controller mother card (*Controller* position in the 7673 controller) must be the one without GPIB connector on it to be able to communicate with CompassCDS (board reference HP_18594-60060). If not (for example the HP_18594-60110 card with a GPIB connector on it), you will not be able to communicate with the autosampler.

NOTE: The synchronization cable is no longer needed since version 1.11.1.6 of the 7673 autosampler. If upgrading the driver of the 5890 to a version greater or equal to the 1.14.1.1, then, just remove this cable.



Controller board without GPIB (ref :HP_18594-60060)

Furthermore the jumper on the *Communication* board of the autosampler must in the position 9.6K as shown below.